

REVISED GENERIC CONCEPTS OF CUPRESSUS L. (CUPRESSACEAE).

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The taxonomy of the Cupressus genus seems to be open to considerable controversy at present. A re-evaluation of the nomenclature seems essential to avoid further taxonomic confusion.

In his monograph of the New World cypresses, Wolf (Aliso 1: 1-250. 1948) elaborated on the problem of generic concepts. Namely, that the species are separated by minor vegetative characters and geographic distribution, as confirmed by Little (Phytologia 20: 429-445. 1970).

As new populations were discovered wild, many distinct kinds were variously classified under previously named species, in several herbaria and in taxonomic manuscripts. It has been suggested that the differences in the species are due, in part, to geographic isolation, natural selection and environmental adaptation.

Under a conservative treatment, 15 species and 12 varieties of Cupressus L. are here recognized as natives of the Northern Hemisphere. In the New World 8 species and 9 varieties are recognized as natives of the southwest United States and Mexico. In the Old World 7 species and 3 varieties are recognized as natives of North Africa, the eastern Mediterranean, the Himalaya and southwest China.

I have basically followed the conservative treatment given by Little (1970) for the New World cypresses, as did Krussmann (Handb. Nadlh. 1. 1972), except that 2 additional Mexican varieties are here recognized. Zavarin (Phytochem. 6: 1387-1394. 1967) reported his works in chemical research of heartwood tropolones, the minor differences related seemed to confirm the close relationships.

Steward (Biol. Conserv. 2: 10-12. 1969) and Barry (Soc. Hist. Natur. Afr. Nord Bull. 61: 95-196. 1970) recognized 3 Mediterranean kinds, which are here considered as varieties of one, as suggested by Ferrandes (Com. Econ. Eur. Nov. 1979 Seminary: 45-49).

Franco (Portug. Acta Biol. Ser. B. 9: 183-195. 1969) recognized 2 Himalayan and 2 Chinese species, but placed a fifth, namely Cupressus funebris Endl. in the Chamaecyparis Spach. genus. However, Zavarin (1967) included C. funebris as a Cupressus because of its close affinities in heartwood tropolones to C. sempervirens. Cheng and Fu (Fl. Reip. Pop. Sin. 7: 328-336.

1978) recognized 4 Chinese kinds, 1 Himalayan species and also retained *C. funebris* as a *Cupressus* species.

CUPRESSACEAE Bartl., Ord. Nat. Pl. 90. 95. 1830.

Evergreen trees or shrubs with fragrant wood and foliage; buds non-scaly; leaves scale like, appressed; male cones small; female cones globose, generally woody, with 4-12 scales bearing numerous seeds; cotyledons 2-6, bluntly acute.

Type Genus: CUPRESSUS Linn., Gen. Pl. 294. 1737. Type Species: CUPRESSUS SEMPERVIRENS L., Sp. Pl. 1002. 1753.

1. CUPRESSUS ARIZONICA Greene, Bull. Torrey Club 9: 64. 1882.

a) CUPRESSUS ARIZONICA var. ARIZONICA (typical)

Tree to 30 m; bark gray, furrowed; leaves pale gray green, acute, glands inconspicuous; male cones 2-5 mm, scales 8-20; female cones 15-25 mm, scales 6-12; cotyledons 3-4, 10-14 mm.

Type: United States, New Mexico, San Francisco Mts, Catron Co, 1 Nov 1880, Greene s.n. (NY, Isotype).

Typical *C. lusitanica* hybridizes with typical *C. arizonica* in northern Mexico (Martinez, Anal. Inst. Biol. 18: 79. 1947).

b) CUPRESSUS ARIZONICA var. GLABRA (Sudw.) Little, Madrono 18: 162. 1966. Smooth-bark Arizona cypress.

Tree to 20 m; bark red, scaly; leaves blue-gray, glands distinct; male cones 3-5 mm, scales 10-18; female cones 20-30 mm, scales 6-10; cotyledons 3-5, 9-13 mm. Possibly a hybrid between typical *C. arizonica* and *C. Bakeri*.

Type: United States, Arizona, Verde Canyon, Yavapai Co, 29 Dec 1909, Sudworth s.n. (RSA, USFS, Isotypes).

c) CUPRESSUS ARIZONICA var. MONTANA (Wiggins) Little, Madrono 18: 163. 1966. San Pedro Martir cypress.

Tree to 20 m; bark gray, furrowed; leaves dark gray green, glands distinct; male cones 3 mm, scales 8-14; female cones open upon maturity, to 30 mm, scales 8-12; cotyledons 3-5, 8-10 mm.

Type: Mexico, Baja California, Sierra San Pedro Martir, La Encantada, 2300 m, 22 Sept 1930, Wiggins & Demaree 4990 (NY, RSA, Isotypes).

d) CUPRESSUS ARIZONICA var. NEVADENSIS (Abrams) Little, Madrono 18: 164. 1966. Piute cypress.

Tree to 20 m; bark gray, furrowed; leaves light gray green, glands distinct; male cones 3-5 mm, scales 10-16; female cones 20-30 mm, scales 6-8; cotyledons 3-5, 7-15 mm.

Type: United States, California, Piute Mts, Kern Co, nr Bodfish, 1524-1830 m, 29 July 1915, Abrams 5368 (RSA, Isotype).

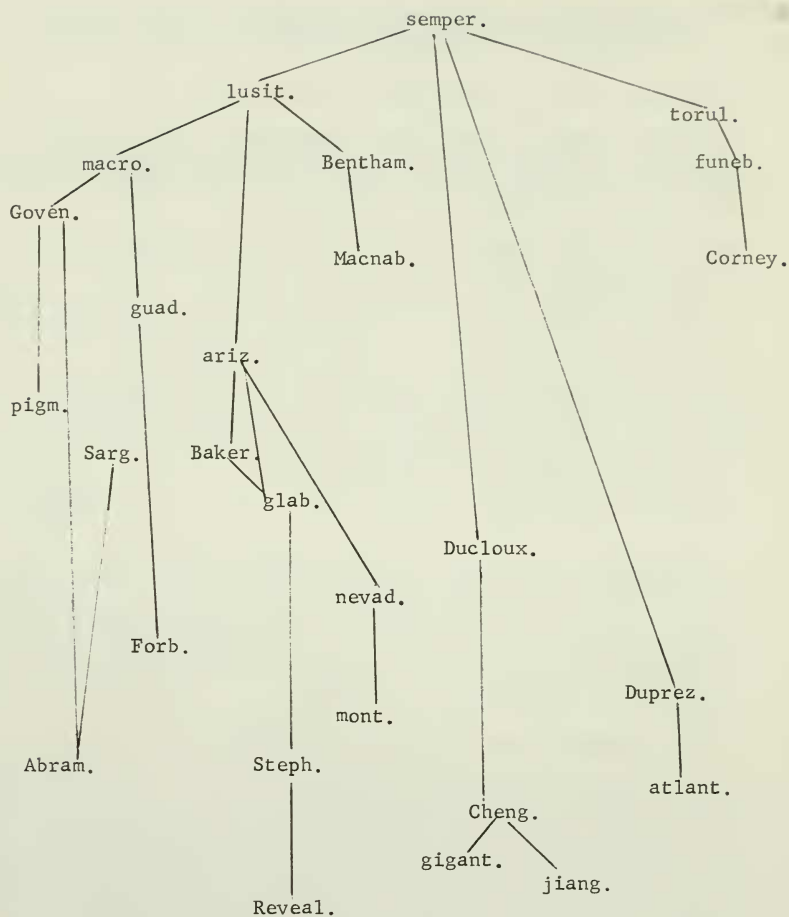


Fig. 1. Evolution of the Cupressus genus. Due to space limitations, specific names were abbreviated.

e) *CUPRESSUS ARIZONICA* var. *REVEALIANA* Silba, var. nova.

Arbor affinis var. *Stephensonii*, sed differt foliis glandulosa et affinis var. *glabra*, sed distinguenda in galbulis, 15-20 mm longis.

Tree to 10 m with a rounded crown; bark red, scaly; leaves gray green, 1-1.5 mm, glands apparent; male cones 3-4 mm, 1.8 mm thick, scales 8-12; female cones glaucous brown, 15-20 mm, scales 6-10, umbos prominent; seeds brown, often glaucous; cotyledons 4-6, 9-10 mm.

Type: Mexico, Baja California, Sierra Juarez, El Rincon, 1200 m, 21 Apr 1974, Moran 21251 (SD, Holotype).

f) *CUPRESSUS ARIZONICA* var. *STEPHENSONII* (Wolf) Little, Madrono 18: 164. 1966. Cuyamaca or Stephenson cypress.

Tree to 16 m; bark red, scaly; leaves blue gray, glands inconspicuous; male cones 2-4 mm, scales 8-14; female cones 20-35 mm, scales 6-8; cotyledons 3-6, 8-13 mm.

Type: United States, California, Cuyamaca Mts, San Diego Co, King Creek, 1219 m, 1 Dec 1938, Wolf 9467 (NY, RSA, Isotypes).

2. *CUPRESSUS BAKERI* Jeps., Fl. Calif. 1: 61. 1909. Baker cypress.

Synonymy: *Cupressus Bakeri* subsp. *Matthewsii* Wolf, Aliso 1: 83. 1948.

Tree to 30 m; bark red, scaly; leaves gray green, glands distinct; male cones 2-3 mm, scales 8-12; female cones 12-20 mm, scales 4-8; cotyledons 3-4, 8-10 mm.

Type: United States, California, se. Siskiyou Co, nr Dana, 1220 m, Aug 1898, Baker s.n. (JEPS, Holotype). Specimen : California, Siskiyou Co, Seiad Creek, 1158 m, 9 Oct 1934, Wolf & Johnson 6169 (NY).

Zavarin (1967) did not find any significant differences in the two entities of *C. Bakeri* recognized by Wolf (1948).

3. *CUPRESSUS CHENGIANA* Hu, Taiwania 10: 57. 1964. Cheng cypress.

a) *CUPRESSUS CHENGIANA* var. *CHENGIANA* (typical).

Synonymy: *Cupressus fallax* Franco, Portug. Acta Biol. 9: 190. 1969.

Tree to 30 m; bark brown gray, fissured; leaves gray green, obtuse, glands distinct; male cones 2-3 mm, scales 8-12; female cones globose, 15-25 mm, scales 8-10; seeds tan; cotyledons 2, 9-13 mm.

Type: China, Szechuan, Tatsienlu, 2400 m, 2 Nov 1930, Cheng 2066 (A, Holotype; BM, Isotype). Specimen : Szechuan, nw. Wenchuanhsien, 2 Nov 1930, Cheng 2073 (NY).

b) *CUPRESSUS CHENGIANA* var. *JIANGEENSIS* (Zhao) Silba, comb. nova. *Cupressus jiangeensis* Zhao, Acta Phytotax. Sin. 18: 210. 1980.

Tree to 27 m; leaves green; female cones ovoid, to 12 mm, scales 12; seeds yellowish brown.

The description of this taxon given by Zhao (1980) seems to fit in the general range of *C. Chengiana* given by Cheng (1978), except in foliage color and number of cones scales. Only one tree was discovered in its native habitat (N. Zhao, pers. comm. 1981).

Type: China, Szechuan, Jiange Xian, 840 m, 21 Jun 1978, Cai & Min 101-104 (PE, Isotypes).

4. *CUPRESSUS CORNEYANA* Carr., Tr. Conif., 128. 1855.

Tree to 45 m; bark gray, fissured or shreddy; leaves acute, yellowish green, glands apparent; male cones 3-5 mm, scales 14-18; female cones 12-20 mm, scales 8-10; cotyledons 3-5, 8-13 mm.

Specimens: Bhutan, Dewangiri, cult., 6 Jan 1838, Griffith 27 (K); Bhutan, Norbding, Pele La, wild, 2550 m, 16 Apr 1979, Grierson & Long 1079 (E).

5. *CUPRESSUS DUCLOUXIANA* Hickel, Camus in Les Cypres, 91. 1914.

Tree to 60 m; bark red brown, fissured; leaves obtuse, blue green, glands apparent; male cones 4-6 mm, scales 12-16; female cones 15-30 mm, scales 6-8; seeds warty; cotyledons 2, 13-18 mm. long.

Specimens: China, Yunnan, Kunming, cult., ann. 1907, Ducloux 5439 (P); Tibet, Trulung, Pome, wild, 1950 m, 11 Jan 1947, Ludlow, Sherriff & Elliot 12130 (BM).

6. *CUPRESSUS FUNEBRIS* Endl., Syn. Conif. 58. 1847.

Tree to 35 m; bark gray brown, fissured; branchlets flattened; leaves acute, pale green, glands apparent; male cones 3-5 mm, scales 12-16; female cones 8-15 mm, scales 8, opening upon maturity; cotyledons 3-5, 8-10 mm.

Specimens: China, w.; Changyang, Trieko, 1219 m, ann. 1903, Wilson 333 (NY); Nanking, nr Kwan-yin-tung, 10 Aug 1927, Chiao 14809 (NY).

7. *CUPRESSUS GIGANTEA* Cheng et Fu, Acta Phytotax. Sin. 13: 85, pl. 16. 1975. Giant or Tsangpo River cypress.

Tree to 45 m; bark gray-purple-brown, fissured; leaves blue-gray-green, obtuse, glands distinct; female cones 16-20 mm, scales 12, umbos prominent; cotyledons 2, 11-13 mm.

Type: China, Tibet, Tsangpo River, Lang Xian, 3000 m, Quing-Zang 3318, 1974 (PE, Isotype).



Fig. 2. Type tree of *Cupressus Chengiana* var. *jianggeensis* in center, other trees are *C. funebris*. Photo courtesy of N. Zhao (received 1981).

8. CUPRESSUS GOVENIANA Gord., Journ. Hort. Soc. 4: 295. 1849.

a) CUPRESSUS GOVENIANA var. GOVENIANA (typical)

Tree to 12 m; bark gray, furrowed; leaves dark green, acute, glands absent; male cones 3-4 mm, scales 12-14; female cones 15-20 mm, scales 6-10; seeds brown, warty; cotyledons 3-5, 8-12 mm.

Specimen: United States, California, Monterey Co, nr Carmel, ann. 1868-9, Kellog & Harford 932 (NY).

b) CUPRESSUS GOVENIANA var. ABRAMSIANA (Wolf) Little, Phytologia 20: 435. 1970. Santa Cruz cypress.

Tree to 18 m; leaves bright green; male cones 3-4 mm, scales 10-16; female cones 20-30 mm, scales 8-10; seeds non-warty, flattened, often glaucous; cotyledons 3-5, 9-12 mm.

Type: United States, California, Santa Cruz Mts, Santa Cruz Co, 487 m, Wolf 6235 (RSA Prop. No. 2185), 9 Nov 1934, (RSA, Holotype; NY, Isotype).

c) CUPRESSUS GOVENIANA var. PIGMAEA Lemm., Handb. W.-Amer. Cone-Bearers. Ed. 3. 77. 1895. Mendocino cypress.

Tree to 60 m; bark gray brown; leaves dull, blackish green; male cones 3-4 mm, scales 12-14; female cones 15-20 mm, scales 8-10; seeds black, warty; cotyledons 3-4, 8-12 mm.

Type: United States, California, Mendocino Co, White Ashy Plains nr Mendocino, 300 m, Aug 1894, Lemmon 188 (UC, Holotype).

9. CUPRESSUS GUADALUPENSIS Wats., Proc. Am. Acad. 14: 300. 1879.

a) CUPRESSUS GUADALUPENSIS var. GUADALUPENSIS (typical)

Tree to 20 m; bark red, scaly; leaves acute, blue green, glands apparent; male cones 3-6 mm, scales 14-18; female cones 25-40 mm, scales 8-10; seeds glaucous brown; cotyledons 3-6, 7-13 mm.

Type: Mexico, Guadalupe Island off coast of Baja California, 900 m, 1892-3, Francheschi s.n. (UC, Holotype); ann. 1875, Palmer 92 (NY).

b) CUPRESSUS GUADALUPENSIS var. FORBESII (Jeps.) Little, Phytologia 20: 435. 1970.

Tree to 10 m; leaves rich green; male cones 3-4 mm, scales 10-14; female cones 20-30 mm, scales 6-10; seeds brown, non-glaucous; cotyledons 3-6, 6-15 mm.

Type: United States, California, Otay Mt, San Diego Co, 610 m, 30 Dec 1907, Forbes s.n. (JEPS, Holotype).

10. CUPRESSUS LUSITANICA Mill., Gard. Dict., ed. 8. n.3. 1768.

a) CUPRESSUS LUSITANICA var. LUSITANICA (typical)

Synonymy: Cupressus Lindleyi Klotzsch ex Endl., Syn. Conif. 59. 1847.

Tree to 30 m; bark gray, furrowed or shreddy; leaves acute, gray green, glands inconspicuous; male cones 3-4 mm, scales 14-16; female cones open upon maturity, 12-15 mm, scales 6-8; cotyledons 4, 8-10 mm.

Specimens: Portugal, Bussaco, cult., March 1887, A. Moller 214 (NY); Mexico, San Luis Potosi region, wild, ann. 1878, Parry & Palmer 848 (NY); Mexico, Cerro del Pino Ayotla, ann. 1888, Urbina s.n. (MEXU).

I have not observed any significant difference in bark, cotyledons or male and female cones of Mexican and Portuguese material, only differences in leaf color and size.

b) *CUPRESSUS LUSITANICA* var. *BENTHAMII* (Endl.) Carr., Tr. Conf., ed. 2. 155. 1867.

Tree to 20 m; bark gray brown; branchlets flattened; leaves bright green, glands apparent; male cones 2-4 mm, scales 16; female cones 10-15 mm, scales 4-8; cotyledons 3-4, 10-13 mm.

Type: Hort. Huber. Hyeris, cult., 28 Jan 1867, Shuttleworth 122 (NY, Isotype); Mexico, Vera Cruz, Nogales, wild, 2 May 1937, Matuda 1175 (MEXU, NY, Specimens).

11. *CUPRESSUS MACNABIANA* Murr., Edin. New Phil. Journ. II. 1: 293. pl. 11. 1855. MacNab Cypress.

Tree to 10 m; bark gray, furrowed; branchlets flattened; leaves obtuse, dark green, glands distinct; male cones 2-3 mm, scales 6-8; female cones 18-25 mm, scales 6-8; cotyledons 3-5, 10-12 mm.

Specimens: United States, California, Lake Co, ann. 1865, Torrey 87 & Torrey 502 (NY).

Cupressus Macnabiana hybridizes with *C. Sargentii* in Lake County, California (Lawrence, Biochem. Syst. 2: 113-119. 1975).

12. *CUPRESSUS MACROCARPA* Hartw., ex Gord., Journ. Hort. Soc. Lond. 2: 187. 1847. Monterey cypress.

Tree to 25 m; bark gray, furrowed; leaves obtuse, dark green, glands inconspicuous; male cones to 6 mm, scales 12-14; female cones 20-40 mm, scales 8-12; seeds warty; cotyledons 3-5, 10-12 mm.

Specimens: United States, California, Monterey Co, Monterey, ann. 1850, C. Parry s.n. (NY); Monterey Co, Cypress Point, 18 July 1882, Pringle s.n. (NY).

13. *CUPRESSUS SARGENTII* Jepson, Fl. Calif. 1: 61. 1909.

Tree 10-25 m; bark gray or brown, furrowed; leaves bluntly acute, gray green, glands apparent; male cones 3-5 mm, scales 10-12; female cones 15-30 mm, scales 4-10; seeds glaucous brown; cotyledons 3-5, 9-20 mm.

Type: United States, California, Red Mt, Mayacamas Range, Mendocino Co, 914 m, 17 Jun 1908, Jepson 3027 (JEPS, Holotype); Alameda Co, Cedar Mt, 16 Apr 1926, Mason s.n. (NY).

14. CUPRESSUS SEMPERVIRENS L., Sp. Pl. 1002. 1753.

a) CUPRESSUS SEMPERVIRENS var. SEMPERVIRENS (typical)

Synonymy: Cupressus horizontalis Mill., Gard. Dict. ed. 8, n.2. 1768. Cupressus Roylei Carr., Tr. Conif. 1: 128. 1855. Cupressus sempervirens var. numidica Trab. ex Barrion, Bull. Soc. Hort. Tunisia et Rev. Hort Algerie. 17: 309. 1913.

Tree to 40 m; bark gray brown, furrowed; leaves obtuse, dark green, glands apparent; male cones 2.5-3 mm, scales 12-14; female cones 20-35 mm, scales 6-14; seeds oval, 3-6 mm; cotyledons 2, 10 mm. long.

Specimens: Iran, nr Lankoran, ann. 1836, Hohenacker s.n. (NY); Lebanon, Tadmor, nr Nipoli, 12 Sept 1880, Noe 610 (NY); Tunisia, nr Djebel Serdj, ann. 1897, Tellier s.n. (P).

I have not observed any significant difference in bark, leaf, seed or cotyledons in material from Iran, Lebanon and Tunisia, only differences in branching patterns were noted.

b) CUPRESSUS SEMPERVIRENS var. ATLANTICA (Gaussen) Silba, comb. nova. Cupressus atlantica Gaussen, Le Monde des Plantes 45: 55. 1950.

Tree to 40 m; branchlets flattened; leaves blue green, glands distinct; female cones 18-22 mm, scales 8; cotyledons 2-3, 1.5-20 mm.

Type: Moroccan High Atlas, Idni, 15 May 1948, Gaussen s.n. (TL, Holotype).

c) CUPRESSUS SEMPERVIRENS var. DUPREZIANA (Camus) Silba, comb. nova. Cupressus Dupreziana Camus, Bull. Mus. Hist. Nat. Paris. 32: 101. 1926.

Tree to 20 m; branchlets flattened; leaves dark green, glands distinct; female cones 12-24 mm, scales 10-12; seeds somewhat flattened with large wings; cotyledons 2, to 15 mm.

Type: Algeria, Tassili Plateau, between Rhat and Djanet, ann. 1925, Lavauden s.n. (P, Holotype).

The two African cypresses closely resemble the Mediterranean cypress in general habit, including bark and cotyledon features. Their differences in cone size, leaf glands and seed shapes are probably due to environmental adaptation (Ferrandes, 1979 Semin. Com. Econ. Eur.: Les Cypres Africains. p. 45-51. Nov. 1979).

15. CUPRESSUS TORULOSA Don, Lamb. in Decr. Gen. Pinus, ed. 1.2: 18. 1824; Don in Podr. Fl. Nepal, 55. 1. 1825.

Tree to 50 m; bark gray brown, shreddy; leaves acutish, dark green, glands inconspicuous; male cones 3-5 mm, scales 12-16; female cones 13-20 mm, scales 10-12; cotyledons 2, rarely 3, 6-10 mm. long.

Type: India, Kumaon, Sooreh, 1500 m, 12 Jan 1818, Wallich 6046A (K, Holotype); Kumaon, Sooreh, ann. 1832, Wallich 6046B (NY).

I have examined material of C. cashmeriana Royle from the Les Cedres Botanical Garden, Saint Jean Cap Ferrat, France. Trees basically differ from C. torulosa in branching pattern and leaf color. In bark, cone, cotyledon, fragrance and seed features I have not observed any significant differences. This cypress may be regarded as a juvenile cultivar of C. torulosa as suggested by Harrison (Handb. Conif. 4. 1966).

Summary

A brief investigation of taxonomic concepts in the Cupressus genus ~~are~~ given. Descriptions of vegetative parts and herbarium specimens are listed for comparisons and documentation. The evolution chart (fig. 1.) is based on similarities in bark, cone, cotyledon, hardness, heartwood tropolones, leaf and seed characteristics and also habitat.

Nearly all the taxa listed here are in cultivation in the Jermyns Arboretum, Winchester and at Wakehurst Place, Sussex, both in England. Hilliers Nurseries Ltd., Winchester, England and Plus Trees, Argyll, Scotland have seedlings available of nearly all species.